Claims

[1]   A distance measurement method using ultrasonic, comprising the steps of:
        transmitting an ultrasonic pulse having specific frequencies to each object;
        receiving the ultrasonic pulse that is reflected from the object or directly
        transmitted; and
        extracting a specific frequency of the received ultrasonic wave pulse to find an
        arrival time of a first pulse and converting the time into a distance.

[2]   The distance measurement method as claimed in claim 1, wherein the step of
        finding the arrival time and converting the time into the distance further includes
        the step of separating a specific frequency of the ultrasonic and converting an
        arrival time of an ultrasonic that is received for the first time among the
        separated ultrasonic into the distance, in a state where the waveform is mixed
        with noise having different frequency properties from the specific frequency of
        the transmitted ultrasonic.

[3]   The distance measurement method as claimed in claim 1 or 2, wherein in the step
        of converting the time into the distance, the extraction of the specific frequency
        from the received ultrasonic further comprises the steps of:
        amplifying the received ultrasonic to generate an amplified signal;
        weakening a signal of an unnecessary frequency among the amplified signal
        through an analog filter circuit to generate a filtered signal;
        amplifying the filtered signal again to generated a re-amplified signal;
        converting the re-amplified signal into a digital signal; and
        extracting a specific frequency from the converted digital signal through a digital
        signal processing.

[4]   The distance measurement method as claimed in claim 3, further comprising the
        step of specifying a distance range to be excluded when measuring a distance of
        the object, such that a distance exceeding the specified distance range is
        measured

[5]   The distance measurement method as claimed in claim 1, wherein the step of
        receiving the ultrasonic reflected from the object while the object is moving
        comprises changing a received frequency depending on variation of the
        frequency of the transmitted ultrasonic.

[6]   A distance measurement method using ultrasonic, comprising the steps of:
        installing a first receiver for receiving an ultrasonic at a known position;

installing a second receiver for receiving an ultrasonic at an object to be measured;

transmitting an ultrasonic having a specific frequency from a location where a distance from the object will be measured, to the first and second receivers;

extracting specific frequencies of the ultrasonic received from the first and second receivers to find an arrival time of a first signal and converting the time into a distance;

transmitting error information related to a difference between the distance received by the first receiver and the known distance to the second receiver; and

allowing the second receiver to correct the velocity of sound using the error information.

[7]   A distance measurement device using ultrasonic, comprising:

a transmitter for generating an ultrasonic having a specific frequency;

a sensor for detecting the ultrasonic reflected from an object;

an amplifier for amplifying the ultrasonic detected by the sensor;

an analog filter for selectively attenuating other frequencies except for a specific frequency from the ultrasonic amplified by the amplifier;

a secondary amplifier for amplifying an analog signal selected through the analog filter;

an A/D converter for converting the amplified analog signal to a digital data;

a memory for storing the digital data therein;

a digital signal processor for processing the digital data stored in the memory;

an output unit for displaying results processed in the digital signal processor;

a numerical input unit for informing the digital signal processor of a processing condition; and

a communication unit for connecting the digital signal processor and an external apparatus to each other so that the digital signal processor and the external apparatus can exchange information,

wherein a transmission time of a first signal among the received ultrasonic and a delayed time of an arrival time of the first signal calculated in the digital signal processor are measured